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A new bromeliad-inhabiting species of *Omicrus* Sharp from South Brazil

(Coleoptera, Hydrophylidae, Sphaeridiinae)

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A new species of the genus *Omicrus* Sharp, 1879, *O. vanini* spec. nov., from the Santa Catarina State in South Brazil is described and illustrated. The species is very similar to few other Brazilian species, but may be clearly diagnosed by the combination of external characters and male genitalia. All specimens of the new species were collected from the detritus accumulated in the rosettes of the ground-growing bromeliads of the genera *Hohenbergia*, *Nidularium* and *Canistrum*. It is the second known bromeliad-inhabiting species of the genus *Omicrus*.

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Introduction

The tribe Omicrini was erected by Smetana (1975) particularly to include the Neotropical genera *Aculomicrus* Smetana 1990 and *Omicrus* Sharp 1879, the latter of which was until that time considered a genus with peculiar characters not matching any other tribe. The concept of the tribe was later adapted and expanded by Hansen (1991) and currently includes 104 described species in 15 genera (Short & Fikáček 2013). Although originally questioned, the monophyly of the tribe seems to be well supported by molecular data as well as morphological characters (Short & Fikáček 2013, Fikáček et al. 2013).

In the Neotropical region, the tribe is represented by three genera: *Omicrus* Sharp, 1879 with 16 described Neotropical species and four more known from Pacific Islands and Africa; *Aculomicrus* Smetana, 1990 with three described Neotropical species and three from Pacific Islands; and *Lala* Hansen, 1999 with one described and one undescribed species from Brazil (Hansen 1999, Short & Fikáček 2011, Fikáček unpubl. data). All three genera are rather uniformly looking and well defined among the Neotropical species, but the status of the non-Neotropical representatives requires revision (e. g. see Fikáček 2010).

The genus *Omicrus* includes small species less than 2 mm long (except for one species), that are found in humid places associated to decaying plant material. Of the 16 Neotropical species, only three were recorded from Brazil: *O. simplex* Smetana 1975 and *O. duplex* Smetana 1975 from middle-west of Santa Catarina state, and *O. piceus* Smetana 1975 from Amazonas state (Smetana 1975). Only a single species of the genus, *Omicrus ingens* Hansen & Richardson, 1998 from Puerto Rico, was collected in bromeliads so far.

Here we describe a second bromeliad-inhabiting species of the genus, which was collected in the leaf litter accumulated inside of the bromeliad rosettes in Santa Catarina, South Brazil.

Material and methods

The bromeliads were collected in the Atlantic rain forest of Unidade de Conservação Ambiental Desterro (UCAD) (27°30' S, 48°30' W) north of Florianópolis city, and in Santo Amaro da Imeratriz (27°43' S, 48°48' W), both in the Santa Catarina state. In the course of the project, i. e. from March 2002 to March 2006, 416 bromeliads were collected in the field and brought to laboratory where they were examined for arthropods by dismantling each rosette leaf by leaf. All the arthropods were collected, fixed and further deposited in a 70 % ethylalcohol solution. The majority of the bromeliads examined were those growing on the ground, except for *Vriesea vagans* (L. B. Sm.) L. B. Sm. which is a relatively small arboreal bromeliad. In addition once per month between 2003–2004, soil leaf litter was sampled and 25 pitfall traps were installed on the ground around the bromeliads, resulting in 12 samples of leaf litter extracted by Winkler extractor, and 12 × 25 samples from pitfall traps (for detailed information see Rosumek et al. 2008).

Examined specimens of *Omicrus* were partly dry-mounted for examination, taking the photographs and SEM micrographs, and partly examined in alcohol. Scanning Electron Micrographs (SEM) were taken at Universidade Federal de Santa Catarina/UFSC in the Central Laboratory of Electronic Microscopy/LCME using JEOL JSM-6390LV microscope, and in the Department of Palaeontology, National Museum in Prague using Hitachi S-3700N environmental electron microscope. Habitus photographs were taken using Canon EOS 550D digital camera with Canon MP-E 65 mm f/2.8 1–5× macro lens. Genitalia of the holotype were dissected and placed in a drop of alcohol-soluble Euparal resin on a small glass attached to the specimen; they were drawn using a drawing tube attached to the Olympus BX41 compound microscope. Hind wings were removed, distended, glued to a piece of transparent plastic and attached to the specimen; they were drawn using a drawing tube attached to the Zeiss Axioskop compound microscope.

Examined specimens are deposited in the following collections:

MZSP Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil – "Zoological Museum of the University of São Paulo"

NMPC Department of Entomology, National Museum, Prague, Czech Republic

Taxonomy

Omicrus vanini spec. nov.

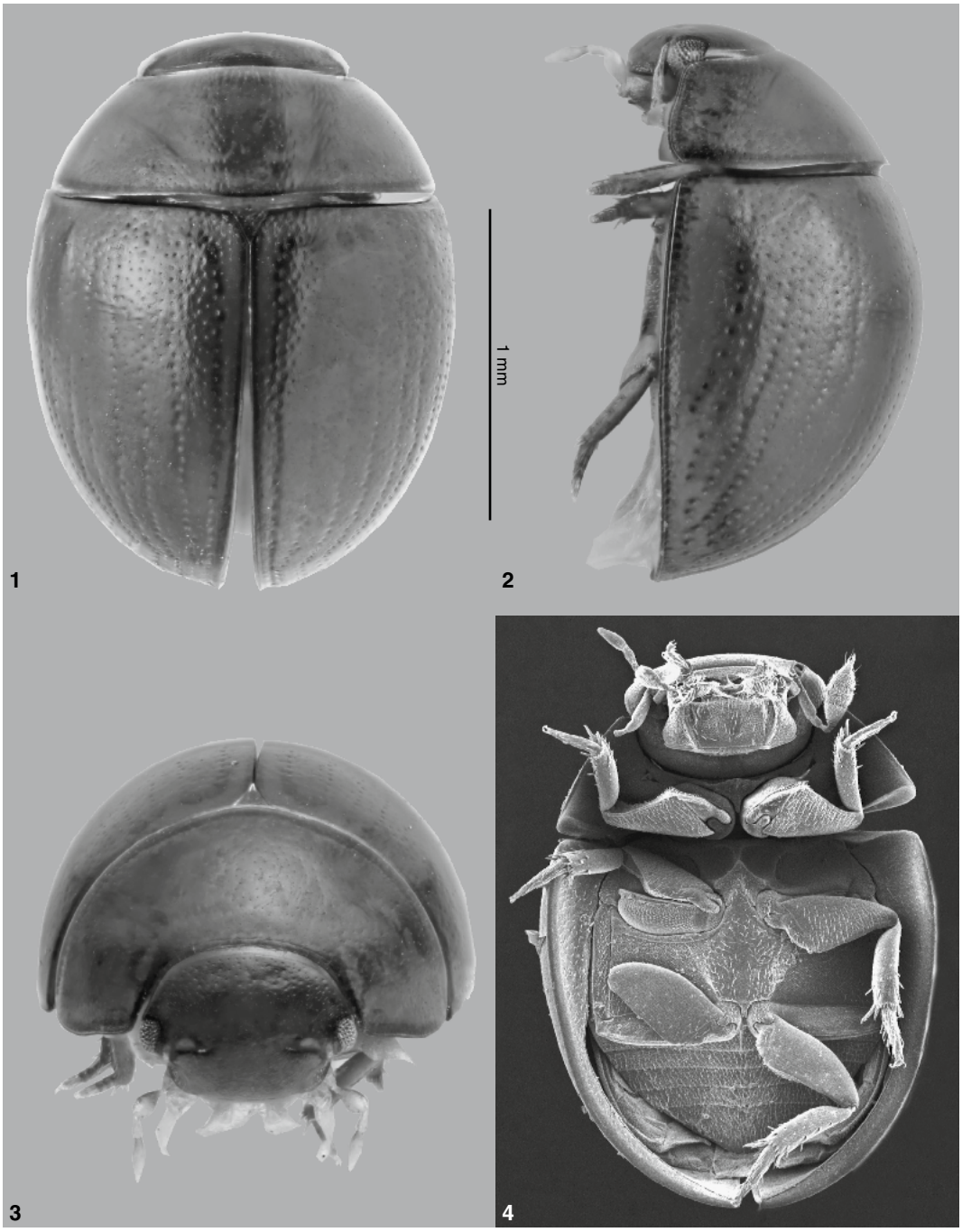
Figs 1–26, 28–29

Type locality. Brazil, Santa Catarina, Florianópolis, Unidade de Conservação Ambiental Desterro (UCAD), wet detritus in bromeliads, coordinates 27°30' S, 48°30' W, altitude less than 150 m.

Type material. Holotype (male): Brazil, Santa Catarina, Florianópolis, UCAD, 15.iv.2002, A. Zillikens & J. Steiner leg. (LANUFSC [Laboratório de Abelhas Nativas da Universidade Federal de Santa Catarina] DB 16), *Hohenbergia augusta* (Bromeliaceae) (MZSP). – Paratypes: 4 specimens (at least 1 male), same data as the holotype (NMPC); 1 male, Brazil, Santa Catarina, Florianópolis, UCAD, 7.viii.2002, plant n° 60, *Hohenbergia augusta*, A. Zillikens leg. (MZSP); 2 specimens, same locality, 14.xii.2004, plant n° 389, *Canistrum lindenii*, A. Zillikens leg. (MZSP); 1 specimen, same locality, 5.vi.2003, plant n° 51, *Hohenbergia augusta*, J. Steiner leg. (MZSP); 1 specimen, same locality, 27.vi.2003, plant n° 99, *Canistrum lindenii*, A. Zillikens leg. (MZSP); 1 specimen, same locality, 25.xi.2003, plant n° 219, *Nidularium innocentii*, M. Recke leg. (MZSP); 1 specimen, same locality, 20.x.2003, plant n° 160, *Canistrum lindenii*, A. Zillikens & J. Steiner leg. (MZSP); 1 specimen, same locality, 15.iv.2002, plant n° 17, *Hohenbergia augusta*, A. Zillikens & J. Steiner leg. (MZSP); 1 specimen, same locality, 10.iii.2004, plant n° 306, *Nidularium innocentii*, A. Zillikens & J. Steiner leg. (MZSP); 1 male, same locality, 9.v.2003, plant n° 69, *Nidularium innocentii*, A. Zillikens & J. Steiner leg. (MZSP); 1 specimen (disarticulated), same locality, 1.ix.2003, plant n° 136, *Canistrum lindenii*, A. Zillikens & J. Steiner leg. (MZSP); 1 specimen, Santo Amaro da Imperatriz, 11.iii.2005, plant n° 404, *Nidularium innocentii*, A. F. Cardoso leg. (MZSP).

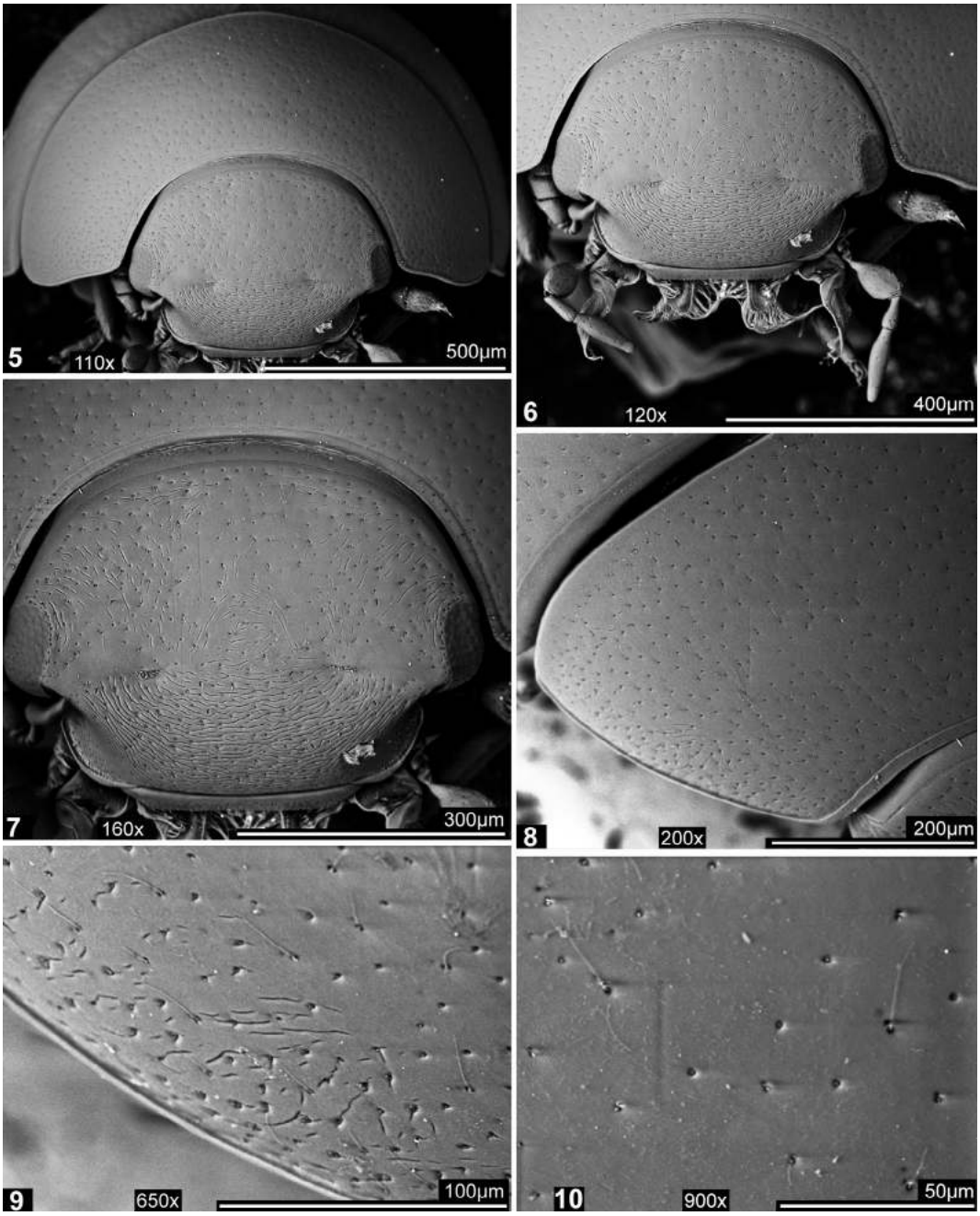
Diagnosis. Body 1.40–1.54 mm long; frons with microsculpture consisting of scattered irregular longitudinal waves laterally; clypeus with strong and dense microsculpture consisting of transverse waves; pronotum with scattered remnants of microsculpture consisting of waves laterally, whole pronotal surface with extremely fine ground mesh-like microsculpture; elytra with 10 complete series of punctures, i.e. the series developed even mesally in anterior third of each elytron; punctures on elytral intervals much smaller than serial ones, but still very distinct; mesoventral plate subpentagonal, approximately as long as wide, with weak median longitudinal keel; phallobase approximately as long as parameres, parameres weakly curved towards apex, median lobe narrow, with large apical gonopore.

Based on the presence of completely developed 10 punctural series on each elytron and pronotum with absence of distinct microsculpture consisting of sharp striae from the majority of dorsal pronotal

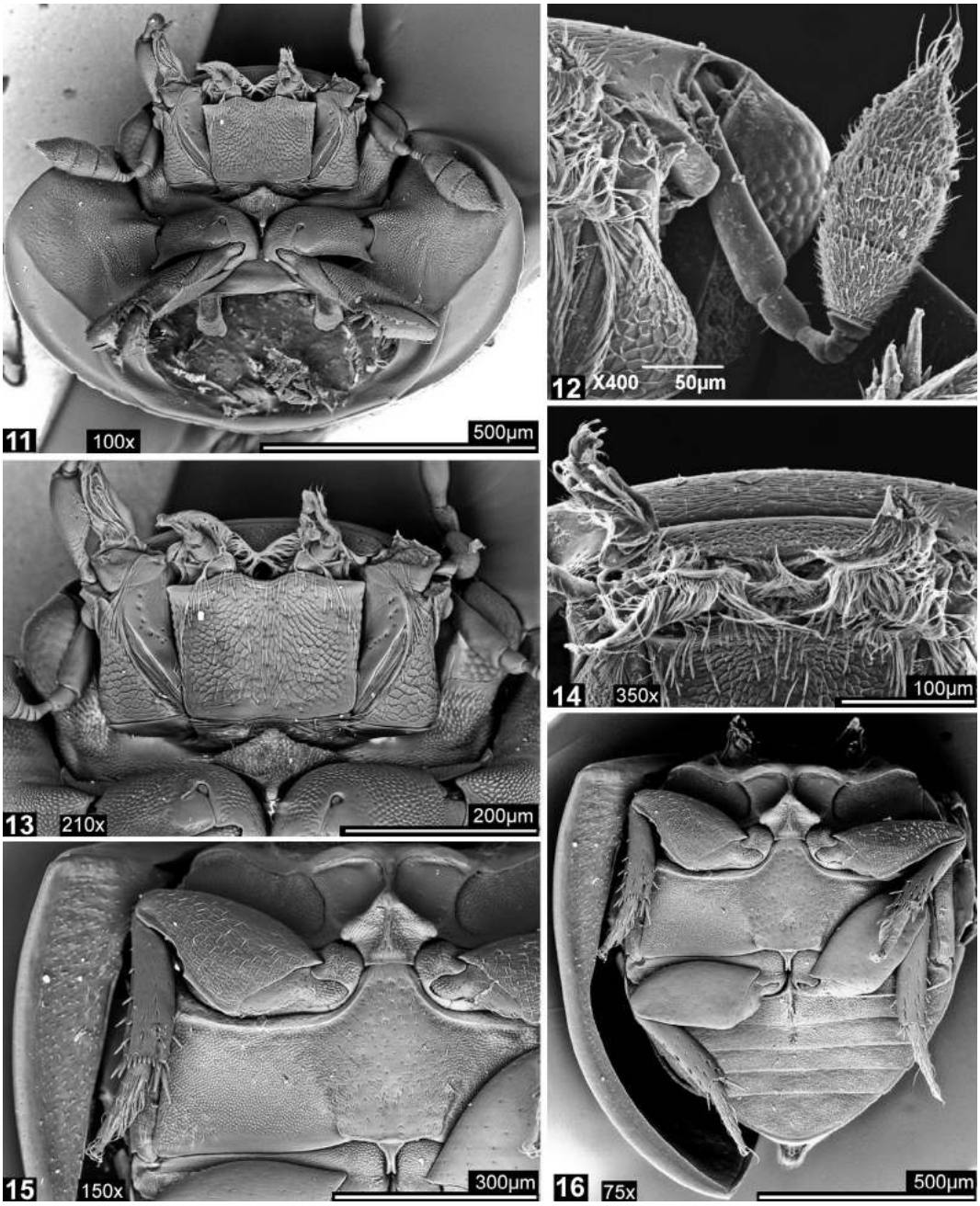


Figs 1–4. *Omicrus vanini* spec. nov. imago habitus. **1.** dorsal; **2.** lateral; **3.** frontal; **4.** ventral SEM image.

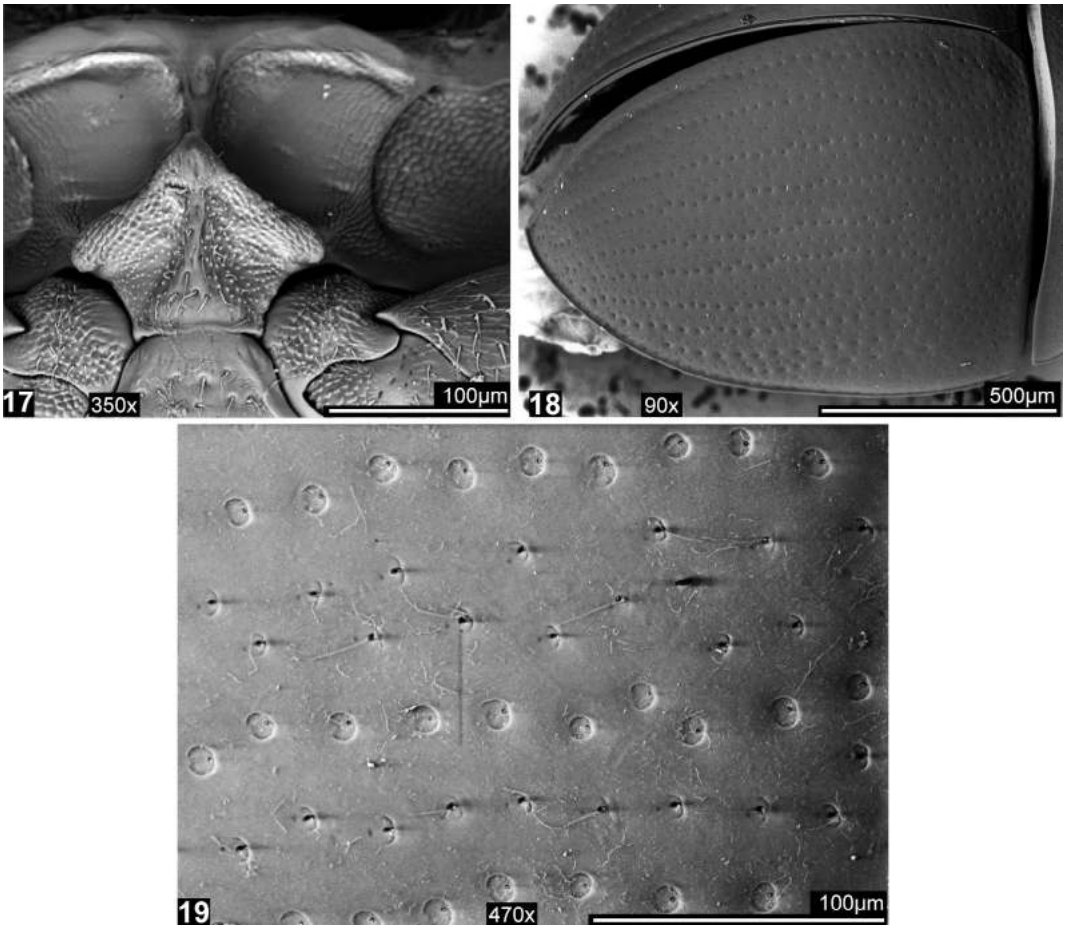
surface (except remnants at lateral margins), the new species resembles *Omicrus piceus* Smetana, 1975, *O. confusus* Smetana, 1975, *O. micans* Smetana, 1975, *O. simplex* Smetana, 1975 and *O. duplex* Smetana, 1975. The presence of the remnants of the microsculpture on lateral margins of the pronotum distinguishes



Figs 5–10. *Omicrus vanini* spec. nov. SEM images. **5.** frontal view; **6–7.** head and mouth parts frontal view; **8.** lateral part of pronotum with setiferous and non-setiferous punctures; **9**. lateral margin of pronotum with several sparse microsculpture; **10.** detail of pronotal punctures.



Figs 11–16. *Omicrus vanini* spec. nov. male imago SEM images. **11.** head and prothorax ventral view; **12.** left antenna ventral view; **13.** mouth parts and prosternum ventral view; **14.** maxilla and labial palpi ventral view; **15.** mesoventrite, metaventrite and right mesothoracic leg; **16.** pterothorax and abdomen in ventral view.

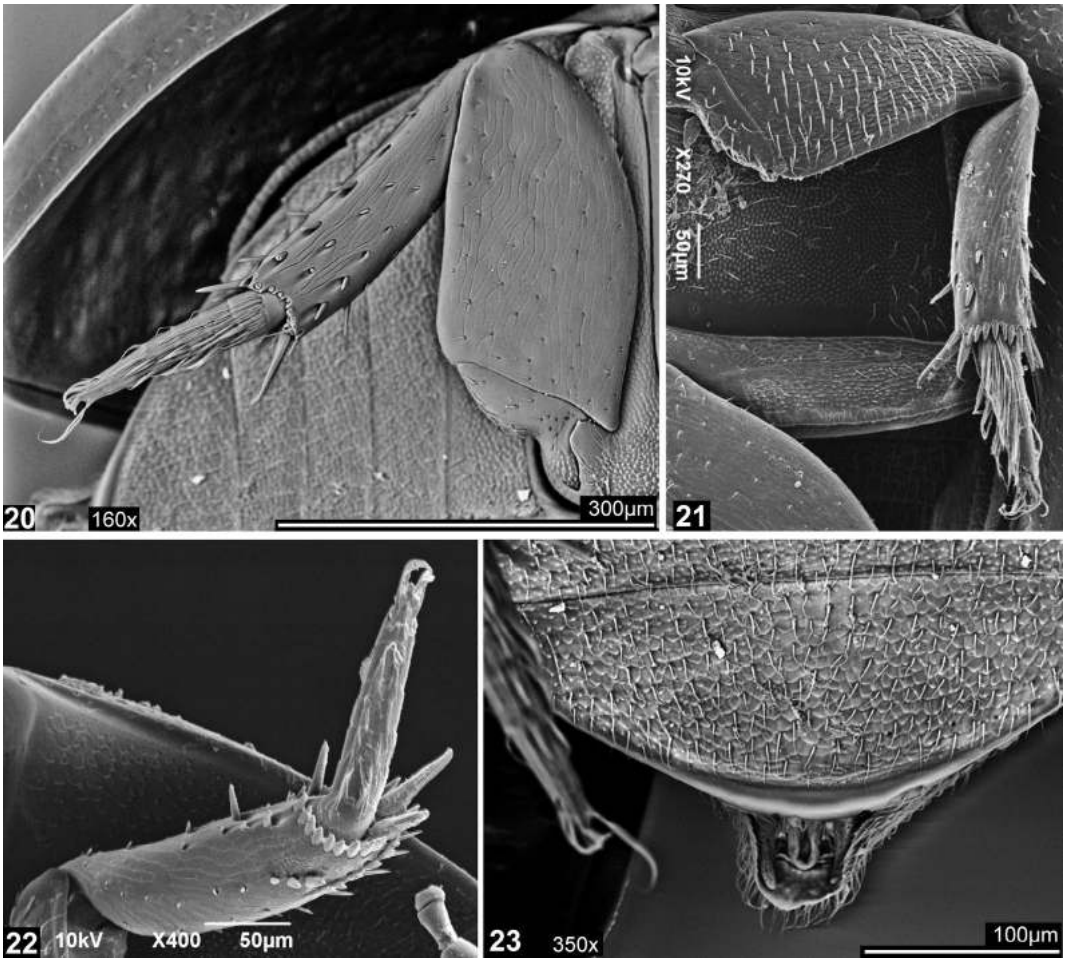


Figs 17–19. *Omicrus vanini* spec. nov. male imago SEM images. **17.** mesoventral projection; **18.** right elytra dorsal view; **19.** elytral punctuation.

it from all these species except *O. confusus*, which however differs by indistinct pronotal punctation (distinct in *O. vanini*), elytral series not developed anteromesally (completely developed including in the anteromesal portion in *O. vanini*) and by the morphology of the aedeagus with phallobase and median lobe shorter than parameres and phallobase slightly narrowing from the last 1/5 (phallobase as long as parameres, median lobe slightly shorter than parameres and apex of phallobase convergent from basal third, in *O. vanini*) (compare fig. 25 with fig. 7 in Smetana (1975)). The new species also differs from *O. micans* and *O. simplex* by the presence of very distinct microsculpture on the clypeus (absent in the latter two species) and by different morphology of the aedeagus (phallobase much longer than paramere in *O. micans*; median lobe narrower and parallel-sided in apical half, suddenly widened basally, and without large apical gonopore in *O. simplex*). From *O. simplex* and *O. duplex* it may be also distinguished by the elytral series distinctly developed in anterior portion of elytron. It differs from *O. piceus* and *O. confusus* by the presence of fine mesh-like microsculpture on the whole pronotal surface (best seen on dry specimens using undiffused light), from *O. piceus* also by paler general coloration and coarser head punctuation.

Description

Body (Figs 1–4) widely elongate oval in dorsal view, widest just after base of elytra and then continuously narrowing posteriorly; evenly convex in lateral view; head inclined in natural position. Body length 1.40–1.54 mm ($\bar{x}$ = 1.48, s.d. = 0.041, n = 11; length of holotype: 1.46 mm); body width 1.05–1.18 mm ($\bar{x}$ = 1.12, s.d. = 0.041, n = 11; width of holotype: 1.10 mm).



Figs 20–23. *Omicrus vanini* spec. nov. male imago SEM images. **20.** right metathoracic leg ventral view; **21.** left mesothoracic leg ventral view; **22.** left prothoracic tibia and tarsus; **23.** abdominal sternite five showing apex of medial lobe and parameres ventral view.

Coloration. Dorsal surface brown, clypeus slightly paler, base of pronotum transversally marked with a black line. Ventral side slightly darker than dorsal; labrum, antennae and maxillary palpi light yellowish; tarsi yellowish.

Head (Figs 5–7, 11–14). Widest just anterior eyes, constricted above antennal base. Dorsal surface of head covered with fine sparsely arranged setiferous punctures; interstices on frons with fine and sparse microsculpture consisting of irregular, mainly longitudinal, waves, microsculpture almost missing mesally; a row of fine punctures outlining internal edge of each eye. Clypeus widely and shallowly excised mesally, exposing labrum; lateral portions projecting into wing-like flaps, each flap with distinct marginal bead on anterior margin, surface of projections with many minute setae; dorsal surface of clypeus with moderately dense setiferous punctation, bearing strong irregular (nonlinear) longitudinal furrows, hence clypeus clearly separable from frons by the surface microsculpture. Frontoclypeal suture absent. Labrum light yellow, weakly sclerotized, around 5× wider than long. Eyes small, situated on lateral-most parts of head, separated by ca. 8× of one eye width. Antennae with nine antennomeres; scapus long, almost as long as all other antennomeres combined; pedicel ca. ¼× as long as scapus; antennomeres 4–6 very short, cupula (antennomere 6) larger than antennomeres 4 and 5; antennomeres 7–9 forming a compact and pubescent club with interstices covered with microsetae, and apically bearing several longer setae. Mentum subquadrate, very slightly narrower

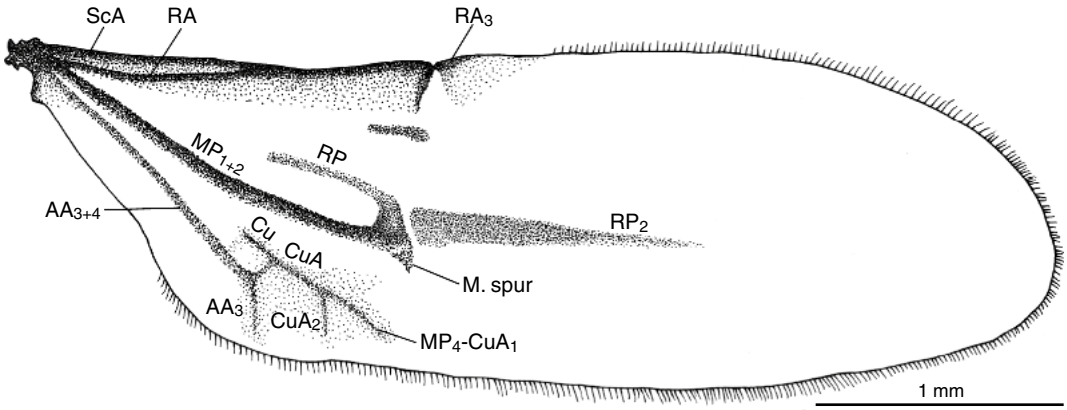


Fig. 24. *Omicrus vanini* spec. nov., left hind wing, microtrichia of membranous area omitted. **M. spur**, median spur.

basally, ca. 1.3 × wider than long, with strong scale-like microsculpture; anterior margin weakly bisinuate; anterolateral portion and a median longitudinal stripe with moderately long setae. Maxilla with basistipes with scale-like microsculpture similar to that in mentum; palpomeres almost as long as antennae; palpomere 1 very short, palpomere 2 almost as long as 4, club-like distally, palpomere 4 the longest, spindle-like.

Prothorax (8–10). Pronotum arcuately narrowing anteriorly, widest at posterior margin, not explanate laterally; anterior and posterior margins weakly sinuated; lateral and anterior margins with weak rim; surface with sparse but distinct punctuation consisting of setiferous punctures (recognizable by the seta and the presence of a smaller puncture adjacent to the setiferous one) intermixed with non-setiferous punctures approximately of the same size; punctuation sparser on medial surface than laterally; lateral margins with several sparse microsculpture consisting of incomplete nonlinear waves. Prosternum extremely reduced and narrowed anterior to procoxae; median portion elevated, subrhomboid, slightly produced posteriorly, almost as wide as long, bearing several setae and spiniform microsculpture; hypomeron well developed, without distinct antennal grooves, with most of the surface with scale-like to spiniform microsculpture.

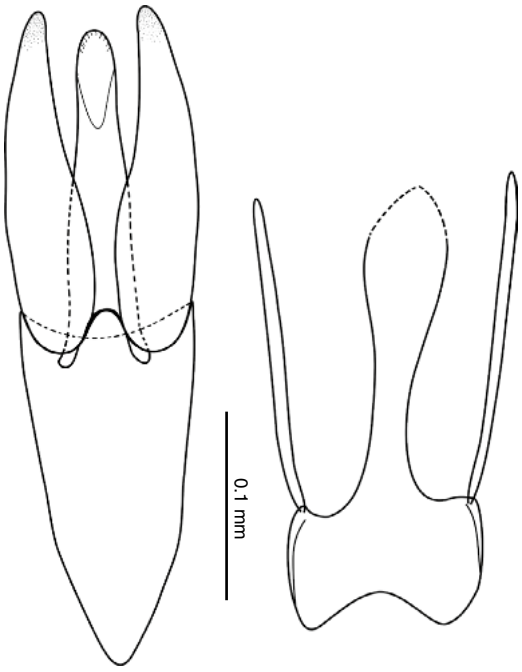


Fig. 25. *Omicrus vanini* spec. nov., male genitalia.

Mesothorax (15–17). Scutellar shield small, slightly wider than long, with few very fine punctures. Elytron with fine sutural stria in apical half, and ten longitudinal rows of large punctures; intervals with finer and irregular punctures between the rows, series 3–6 slightly to distinctly irregular; anterior-most portion of each elytron with irregularly intermixed large and small punctures; lateral elytral margins with a narrow bead. Epipleuron wide throughout elytral length, widest at base, narrowing towards level of distal part of metacoxae; inner portion covered by numerous minute setae strongly reduced in number towards elytral apex; outer bare portion approximately of the same width throughout, reaching elytral apex. Mesoventrite with highly raised preepisternal elevation posteromedially; the elevation subpentagonal, with median obtuse carina widened posteriorly and strongly narrowing anteriorly, bearing many setae; grooves for reception of procoxae well developed, large.

Figs 26–28. *Omicrus vanini* spec. nov. imago and bromeliad *Hohenbergia augusta* (Vellozo) E. Morren. **26.** *H. augusta* on the forest ground; **27–28.** *O. vanini* spec. nov. in the detritus in bromeliad's rosette.

Metathorax (Figs 15–16, 24). Median portion of metaventrite slightly elevated, with relatively long and sparse pubescence; anteromedian process projecting to midlength of mesocoxae; lateral portions of metaventrite bearing denticulate microsculpture with intermixed long setae; metacoxal process projecting to midlength of metacoxae with longitudinal groove ending in a glabrous, bifurcated apex. Hind wings covered by microsetae; anterior, posterior and apical margins bearing setae longer and sparser than microsetae of membrane; veins reaching slightly beyond proximal third of wing length. RA reaching slightly further than MP_{1+2}, RP rather long, weakly sclerotized; RP_2 as a narrow pigmented stripe arising at MP loop and reaching posterior margin subapically; posterior part of the wing with a single vein (AA_{3+4}) reaching basal fourth of wing length, connected to Cu (incomplete) by Cu_{3+4} more distally with pigmented area around AA_3, CuA, CuA_2 and MP_4+CuA_1.

Legs (Figs 4, 15–16, 20–22) short, femora and tibiae flattened. Procoxae large, with strong spine posterolaterally on anterior surface. Pro- and mesofemora wide proximally, narrowing distally, ventral surface with scale-like microsculpture and many moderately long setae; metafemora more robust than pro- and mesofemora, arcuate on anterior margin, ventral surface covered with irregular (nonlinear) longitudinal furrows and sparse microsetae. Tibiae with series of fine spine-like setae on ventral surface, with few larger spines on outer and inner margins, and apex ventrally and laterally crowned with a row of spines, posterior tibial spur ca. as long as tarsomeres 1–3. Tarsal formula 5–5–5; basal metatarsomere ca. as long as metatarsomere 2; pro- and mesotarsi ventrally with long and abundant setae; metatarsi covered with long setae, more abundant ventrally.

Abdomen (Figs 16 and 23) with 5 visible ventrites; surface of all ventrites with strong scale-like microsculpture and moderately dense pubescence; first ventrite mesally with a longitudinal carina throughout its length.

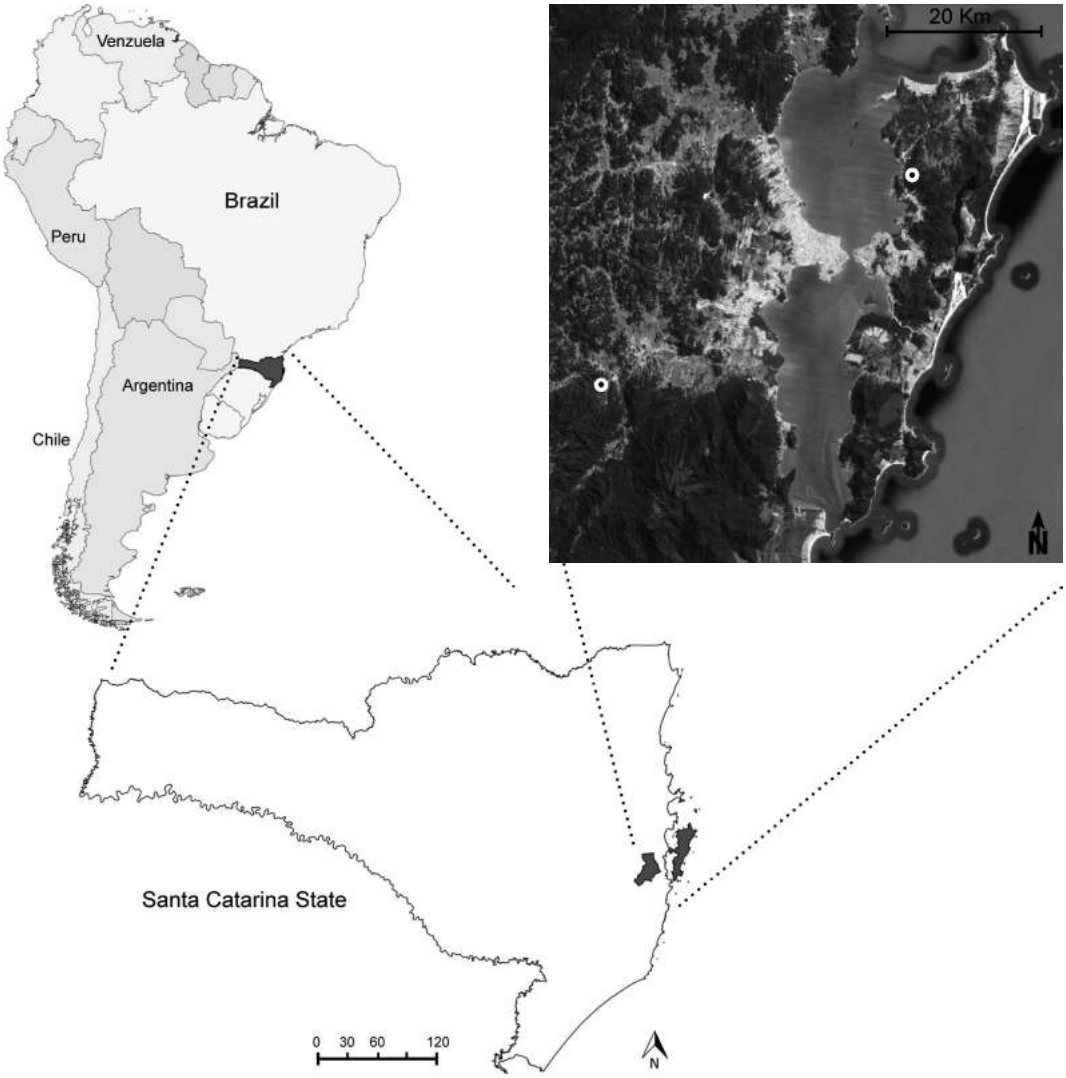


Fig. 29. Distribution of *Omicrus vanini* spec. nov.

Male genitalia (Fig. 25). Aedeagus 0.35 mm long. Phallobase as long as parameres, elongate with lateral margins almost parallel-sided until basal third, then convergent, without distinct manubrium. Parameres 0.19 mm long, widest in basal half, then continuously narrowing towards apex, slightly curved inwards, with numerous micropores (campaniform sensilla) at apex. Median lobe 0.18 mm long, strongly emarginate basally, gradually narrowing apicad, with large apical opening (gonopore) surrounded by a series of microteeth.

Female genitalia. Not examined.

Variability. The coloration varies from light brown (in possibly teneral specimens) to dark brown. Darker specimens have paler lateral margins of elytra and a narrow pale stripe along the elytral suture. The prosternum slightly varies in the degree of elevation of the anterior mesal projection. The surface of the metaventrite varies from relatively densely setose to sparsely setose.

Biology (Figs 26–28)**.** All specimens were collected in the moist accumulated litter inside the bromeliad rosettes of three species of ground-growing bromeliads: *Hohenbergia augusta* (Vellozo) E. Morren (9 records), *Nidularium innocentii* Lemaire (6 records),

and *Canistrum lindenii* (Regei) Mez (5 records). No specimen of *Omicrus vanini* spec. nov. was found in the leaf litter outside of bromeliads and in the pitfall traps installed in the same area (F. F. Albertoni, A. Zillikens & J. Steiner unpublished data).

Distribution. Only known from two localities situated in the neighbourhood of the Florianópolis and Santo Amaro da Imperatriz cities, in the Santa Catarina State, Brazil (Fig. 29), none place higher than 200 meters.

Etymology. The new species is dedicated to Dr. Sergio A. Vanin (Instituto de Biociências, Universidade de São Paulo) who provided both authors in a very friendly way with many important advices. He also spent part of his career working on and supervising the projects on beetle fauna of bromeliads.

Discussion

Bromeliads are known to host a diverse spectrum of arthropod fauna, including many groups of beetles (Richardson 1999, Frank & Lounibos 2008). Hydrophilid beetles inhabiting bromeliads are represented by species of three genera: *Lachnodacnum* Orchymont, 1937, *Phaenonotum* Sharp, 1882 (both in tribe Coelostomatini Orchymont, 1937; Clarkson et al. 2014) and *Omicrus* Sharp, 1879 (tribe Omicrini Hansen & Richardson, 1998). Only *Lachnodacnum* seems to be specialized for bromeliads as a whole; the other two genera, *Phaenonotum* and *Omicrus*, contain the majority species living outside bromeliads or with unknown specific habitat, with few bromeliad-inhabiting species.

The only bromeliad-inhabiting species of the genus *Omicrus* known by now was *O. ingens* from Puerto Rico. The species was found in the detritus accumulated among the leaves in rosettes of epiphytic bromeliads of the genera *Vriesea* and *Guzmania*, in all cases above the free water accumulated in the rosette. The species is unusual among other *Omicrus* by its extremely large body (2.5–2.8 mm, whereas most other *Omicrus* do not exceed 1.5 mm). It was not clear if the increased size may not be correlated with the unusual life-style of the species, as all other *Omicrus* species were considered as not associated with bromeliads. The discovery of *O. vanini* spec. nov. illustrates well that increased body size does not correlate with bromeliad-inhabiting habits. In contrary, *Omicrus vanini* is in all aspects extremely similar to other Neotropical species of the genus. Moreover, the biology of most described species of *Omicrus* is in fact not known and they are mostly known by few specimens collected accidentally. We cannot therefore exclude that some additional described species are also associated with bromeliads.

Additional collecting effort is clearly needed in order to understand habitat preferences of other *Omicrus* species as well as other minute insects. Unfortunately, the usual method used for searching for entomofauna inside bromeliads, i. e. dismantling the leaves one by one and washing the content in a tray, may not to be effective enough for very small and cryptic species of beetles as is *Omicrus* (Albertoni, pers. observ.). This should be taken into account not only during the field work. It also indicates that the real abundance of *Omicrus vanini* in bromeliads may be higher than we observed. The development of new methods of collecting will be very welcome to discover these very small insects in bromeliads and understand their distribution, abundance and biology.

Acknowledgements

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